

collecting chamber's volume, a dispensing nozzle or spout and a one-way monitoring valve downstream from the collecting chamber (20) to allow outward flow therethrough. A cover placed over the plurality of elastomeric domed walls (18) allows for simultaneous activation of the pump mechanism by downward hand pressure. The compartments (14) can be rigid walled, or preferably can be collapsible pouches. The pouches (14) may form part of a replaceable cartridge.

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MULTI-COMPARTMENT DISPENSER**BACKGROUND OF THE INVENTION**5 **Field of the Invention**

The invention concerns a multi-compartment dispenser for storing and separately delivering different flowable compositions from each compartment via a pump mechanism.

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The Related Art

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Certain types of chemical formulations are storage unstable because two or more ingredients may be mutually incompatible. These antagonisms may result from acid/base reactions, oxidation/reduction decomposition, anionic/cationic precipitation and other types of destructive phenomena.

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Toothpaste technology has long understood the benefits of baking soda and hydrogen peroxide. These materials are unfortunately incompatible. U.S. Patent 4,687,663 (Schaeffer) suggests that baking soda and bicarbonate ingredients can be separately formulated into semi-solid pastes or gels, with each kept in separate compartments of a dispenser. Streams of both semi-solid compositions can be extruded from their respective compartments and placed in contact together on a toothbrush. Schaeffer's concept is embodied in Mentadent® toothpaste packaged within a telescoping piston/cylinder pump dispenser. Details of the dispenser are reported in U.S. Patent 5,020,694 (Pettengill) and U.S. Patent 5,038,963 (Pettengill et al.).

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Various disadvantages are associated with Pettengill type pumps. A user must depress a cylinder of the pump along a given direction. Any lateral pressure causes

binding of the piston to the cylinder. Consequently, this arrangement may at times be awkward to actuate. Extrusion of very small amounts is another challenge in these systems.

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Alternative pumping mechanisms are known in the patent literature. For instance, U.S. Patent 3,486,663 (Humphrey) describes a pump or check-valve consisting of an elastomeric member having a recessed portion adapted for sealing engagement with a supporting surface to define therewith a closed chamber. The supporting surface has two ports opening into the chamber; the elastomeric member has one or two partitions dividing the chamber into a respective number of compartments. These compartments are sloping in relation to the bottom surface of the dispenser.

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A more ergonomically and aesthetically pleasing design is reported in U.S. Patent 3,752,366 (Lawrence, Jr.) illustrating a dome-shaped section, siphon tube with seal and dispensing orifice.

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Other pertinent devices are found in U.S. Patent 3,874,562 (Hazard). The patent discloses a deformable container with a dispensing closure having a cap and a rotary spout adapted to be moved between open and closed positions. The spout serves as a pump to exhaust the contents of the container. Check valves may be mounted on a fitment within the cap to serve as a part of the closure itself.

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U.S. Patent 3,162,334 (Miller) reports a pumping member including a domed diaphragm defining a variable volume chamber. Valve means are formed in a collar surrounding the domed diaphragm to control fluid flow which may exit through a spout.

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Another aspect of the present invention beyond improvement of the pumping mechanism is the use of replaceable cartridges or refills. Refillable dispensers provide one answer to our environmental concern over garbage disposal. Containers which would normally be trashed, or at best partially recycled, can with a refill concept be reused numerous times. This represents the most convenient way for consumers to help reduce landfill waste. Moreover, recycling costs are lowered with respect to collecting, storing and disposing of plastic containers.

A popular approach to the refill concept has been assemblies in which the product to be dispensed is contained within a flexible pouch. Assemblies of this kind are used more particularly in cases where the distributor head, associated with the flexible pouch, forms a pump without recirculation of air or in the case of dispensers of the aerosol variety in which product is introduced into a flexible pouch and a propellant is introduced into a can surrounding the pouch.

Flexible pouches usually consist of a bag comprising two walls of variable shape, e.g. rectangular, the walls being welded at least on one side. The flexible pouch is fixed in a sealed manner, usually by means of welding to a distributor head. As product is dispensed, the flexible pouch gradually empties and, consequently, its walls draw together. Therefore, the two walls often come into contact with one another before all of the product has been dispensed. These walls stick together over one or several zones, wherein the zones can then form an impenetrable barrier. Part of the product to be dispensed is trapped in this manner. It then becomes impossible to dispense it. Losses resulting from trapping can be quite considerable.

U.S. Patent 5,139,168 (Gueret) reports mitigating the trapped product problem by introducing within the flexible pouch a semi-rigid screen parallel to the output axis of the product. By virtue of this screen, it is possible to keep the walls of the flexible pouch at a distance from one another to prevent them sticking together and blocking flow.

Nursing bottles based on a bag system have also encountered the problem of irregular collapse. U.S. Patent 3,998,348 (Sammartitano) discloses a nursing bottle assembly with a flexible inner bag being biased at its lower end by a roller assembly. The assembly includes a cylinder which applies continuous pressure against the flexible bag and moves upwards as product is dispensed.

A less intrusive, more economical system for avoiding trapped product pockets is disclosed in a series of patents to Stoody including U.S. Patent 5,004,123; U.S. Patent 5,005,733 and U.S. Patent 5,012,956. These patents are all based on the concept of a collapsible flaccid bag provided with a passive mechanism for managing collapsing that avoids fluid retention pockets without regard to attitude of the containment bottle. The passive mechanism is described as a flimsy, substantially rectangular shaped film of plastic which extends from the bottom region of the bag to a short distance from its outlet. The Stoody patents describe a variety of dispensing heads including pumps and nipple fitted squeeze bottles. Still better dispensing mechanisms are required before this flaccid bag technology could be turned into a commercially viable system.

Accordingly, it is an object of the present invention to provide a multi-compartment dispenser for separately storing different compositions in a system where product flow can be very precisely controlled.

Another object of the present invention is to provide a multi-compartment dispenser for separately storing different compositions wherein the dispenser is fitted with a pump mechanism having an actuating member depressible by hand pressure from practically any angle thereby eliminating piston binding.

Still another object of the present invention is to provide a multi-compartment dispenser capable of receiving refill cartridges which can be quickly and easily loaded into the dispenser without mixing, pouring, spillage or messiness.

Yet another object of the present invention is to provide a multi-compartment dispenser wherein the refill cartridges are formed of a flexible pouch and are capable of having over 90% of its product contents evacuated.

An even further object of the present invention is to provide a multi-compartment dispenser capable of receiving refill cartridges allowing consumers to easily load/unload while eliminating the possibility of air inadvertently entering the cartridge thereby maintaining the vacuum responsible for product delivery.

SUMMARY OF THE INVENTION

A multi-compartment dispenser is provided including:

- (i) a container having a first and second end;
- (ii) a plurality of compartments within the container, each compartment storing a pumpable product;
- (iii) a plurality of pump mechanisms each for drawing product from a respective one of the plurality of compartments, the pump mechanism being positioned over the first end of the container and including:

- (a) a connector tube with upper and lower ends;
- (b) a collecting chamber for receiving product drawn upward from the connector tube;
- (c) a one-way check valve interposed between the upper end of the connector tube and the collecting chamber;
- (d) an elastomeric wall at least partially positioned over and communicating with the collecting chamber, the elastomeric wall being resiliently pressable thereby capable of compressing the collecting chamber;
- (e) a dispensing member communicating with the collecting chamber having an exit orifice through which product can flow outward;
- (f) a one-way monitoring valve downstream from the collecting chamber controlling the outward flow through the dispensing member;
- (iv) a mechanism to simultaneously activate the plurality of pump mechanisms.

Most preferably the dispenser will have two compartments. Product from each of the compartments can flow outward through respective channels of a distributing nozzle downstream from the respective one-way monitoring valves. The nozzle may either be an immobile structure molded as part of the container or be a separate flip-up spout. When formed as a flip-up spout, the nozzle may be outwardly pivotable through an arc of at least 60°. The one-way monitoring valve may be regulated through the positioning of the spout. When flipped down, the one-way

monitoring valve may effectively be closed. Valve opening will occur when the spout is flipped in the up position.

5 The one-way monitoring valve preferably is formed of an elastomeric rubber having a slitted end. Flow is regulated by variation of pressure exerted to open the normally closed rubber exit slit.

10 A top cover of the dispenser extends across the top of the compartments. Downward oriented sets of ribs are formed on an underside of the cover. Each set of ribs is placed directly above the respective elastomeric wall. This wall forms a roof at least partially covering the collecting chamber in each of the compartments.

15 Activation of the dispensing system occurs by placing downward pressure onto the top cover. The ribs then exert pressure on their respective elastomeric wall which compresses the respective collecting chamber. Compression
20 forces product out of the collecting chamber. Pressure from the resultant product flow opens the one-way monitoring valve allowing product to exit the nozzle or spout.

25 Release of hand pressure against the top cover allows the elastomeric wall to rebound upward. A vacuum is thereby created within the collecting chamber. The one-way check valve opens when this vacuum causes a ball within the valve body to move upward from a seated to an unseated position. Suction then allows product to flow from the respective
30 compartment upward through the open check valve to refill the collecting chamber. Now the pump is again in its primed state awaiting another downward stroke of the top cover.

35 Compartments of the present invention may be rigid-walled. Under such circumstances, the pumping system must

be vented for introducing air into the container to maintain atmospheric pressure against the product to force same up the dip tube. Venting can be accomplished by providing a passageway whose opening is regulated in concert with the movement of the elastomeric wall. An atmospheric air inlet may be formed as a mouth at least partially defined by an exterior surface of the elastomeric wall. When the elastomeric wall is in a downwardly compressed position, the mouth of the passageway becomes open allowing air to communicate down into the respective compartments to repressurize space above the stored product. Release of pressure against the elastomeric wall results in closing the air inlet mouth.

An alternative embodiment substitutes the rigid walled compartment with a replaceable cartridge whose walls are formed as a collapsible pouch. The advantage of a refill cartridge is that it offers a modular approach. No longer is it necessary to throw away a dispenser of considerable plastic construction. Use of the refill helps reduce landfill waste. The refill cartridge is simple to insert, requires no mixing, no pouring, no spillage and results in no mess. Constructions with collapsible pouches may achieve more than 90% evacuation of product compared to the 60-70% with ordinary rigid-wall dispensers. Not only is the consumer benefitted but manufactures gain because they do not have to overfill to achieve the labelled dispensed weight contents. Neither does the product at any time contact surfaces of the container. For this reason, recycled plastic can be employed for such container without fear of safety/contamination issues. A still further aspect of this invention is that the same refillable pump dispenser can be filled with different capacity pouches.

A preferred version of a refill cartridge is an embodiment wherein the collapsible pouch is a passive flaccid bag having integral therewith at least one passive mechanism that manages collapsing of the bag. Particularly effective as the passive mechanism is a flimsy, substantially rectangular shaped film of plastic extending from a bottom region of the bag to a short distance from the dispensing end. The plastic film maintains bag rigidity to assure complete emptying of the bag at final stages of aspirating product.

Advantageously the pouch will include an annular fitment across the dispensing end for securing walls of the bag thereto. The annular fitment may be provided with a frangible septum. A sharpened mouth can be formed at the lower end of the connector tube for puncturing the septum to begin product flow. Puncture can be triggered through joinder of the cartridge to the pump mechanism.

A locking aperture may be formed within an outer wall of the annular fitment. A snap lock post projecting downwardly from its attachment to the pump mechanism may be engageable within the aperture to lockingly join refill cartridge to pump mechanism.

BRIEF DESCRIPTION OF THE DRAWING

The above objects, features and advantages of the present invention will become more readily understood in connection with the detailed description of preferred embodiments, when considered with the accompanying drawing in which:

Fig. 1 is a front elevational view of a pump dispenser with rigid nozzle according to the present invention;

5 Fig. 2 is a front elevational view of a pump dispenser with movable flip-up spout according to the present invention;

10 Fig. 3 is a partial cross-sectional view of the dispenser in Fig. 1 taken along line 3-3;

Fig. 4 is a top plan view of the elastomeric walled pressure pads component forming part of the collecting chamber;

15 Fig. 5 is a side elevational view of the elastomeric walled pressure pads component shown in Fig. 4;

20 Fig. 6 is an exploded view of the cover and two main pump unit sections of the dispenser per the embodiment shown in Fig. 1;

Fig. 7 is a bottom plan view of the cover shown as the top section in Fig. 6;

25 Fig. 8 is a partial cross-sectional view through one of the collecting chambers illustrating the effect of compression;

30 Fig. 9 is a bottom plan view of a collar section with molded nozzle per the embodiment shown in Fig. 1;

Fig. 10 is a top plan view of the collar section shown in Fig. 9;

Fig. 11 is a partial cross-sectional view of the yoke within which are inserted the elastomeric walled pressure pads of Fig. 4;

5 Fig. 12 is a partial cross-sectional enlarged view of a section on the dispenser showing locking of the collecting chamber portion to the container;

10 Fig. 13 is a top plan view of the platform shown as the lowest section in Fig. 6;

Fig. 14 is a front side view of the platform shown as the lowest section in Fig. 6;

15 Fig. 15 is a side view of the platform shown as the lowest section in Fig. 6;

20 Fig. 16 is a cross-sectional view of the platform taken along line 16-16 of Fig. 14;

Fig. 17 is a cross-sectional view of the platform taken along line 17-17 of Fig. 14; and

25 Fig. 18 is a front elevational view of a refill cartridge whose insertion into the dispenser is shown in Fig. 3.

DETAILED DESCRIPTION OF THE INVENTION

30 According to the present invention there is provided a multi-compartment dispenser consisting of a container 2 mounted with a pump mechanism 4 surrounded by a collar 6. Other elements of the dispenser include a nozzle 8 molded onto collar 6 and a dispenser cover 10 to actuate the pump
35 mechanism 4.

Fig. 2 illustrates a second embodiment wherein the nozzle is movable and can pivot through an arc of at least 60°. In this alternate embodiment the nozzle is identified as spout 12. Movement of the spout can occur through a pinion and complementary recess arrangement formed at the end of the spout 12 and in a window on collar 6.

Fig. 3 best illustrates the pump mechanism 4 and its inter-relationship with a pair of compartments shown as refill cartridges 14.

The pump mechanism includes a pair of pressure pads 16 formed as resilient elastomeric domed walls 18. Fig. 4 and 5 best illustrate the elastomeric domed walls 18.

A collecting chamber 20 is defined in an area bounded by the elastomeric domed wall 18 and a one-way check valve 22. Within valve 22 is a ball 24 which can move between a seated and an unseated position to regulate entry of product from the refill cartridge 14. Interposed between the check valve and refill cartridge is a connector tube 26.

Another important element of the pumping mechanism is a one-way monitoring valve 28 receiving product flow from collecting chamber 20 during the dispensing procedure. The one-way monitoring valve 28 is shown in Fig. 5 and 8 as a rubberized member with a flexing flap 30 displaceable upon pressure from a product flow. An alternative embodiment for the one-way monitoring valve can be a wedge shaped elastomeric plug. Normally the plug, also known as a duckbill valve, is in a closed relationship. Only upon pressure of product flow will the central flow orifice open. This orifice can be a slit in the duckbill.

Fig. 6 illustrates an exploded view showing cover 10, collar 6 and a bottom platform 32 defining a floor 34 of collecting chamber 20. Cover 10 on an undersurface 36 includes a downwardly projecting post 38 for snap locking together with an engageable aperture 40 of collar 6. A set of ribs 42 project downwardly from the undersurface 36 of the cover.

Groove 44 is molded around the circumference of an upper end of collar 6. Skirt 46 flanks the sides of cover 10. Lower edge 48 of the skirt is arranged to slidably move within groove 44 of the collar.

Openings 50 within collar 6 are aligned to receive pressure pads 16 shown in Fig. 4 and 5.

Platform 32 along its lower margin is provided with a ledge 52. Spaced apart snap lugs 54 ensure tight engagement with collar 6 when assembled to sandwich the pressure pads 16 therebetween.

Lower half portions of nozzle 8 are molded into platform 32. Panel 56 divides nozzle 8 into separate channels 58. These channels 58 are unitarily molded with the nozzle collar, as best shown in Fig. 9. Upper and lower halves of nozzle 8 are best secured through welding.

Fig. 12 illustrates how the elastomeric domed wall 18 is sealed at an L-shaped juncture 60 against a lower wall of collar 6. Fig. 12 further illustrates joinder of snap lugs 54 against an inner wall of collar 6.

Fig. 13-17 illustrate various views and cross-sectional cuts through platform 32. Particularly shown is the connector tube 26 whose lower end features a sharpened mouth

62. This sharpened mouth is cut at an acute angle to a longitudinal axis of the connector tube. Fig. 17 also illustrates a further post 64 intended to couple into recess 66 formed in an upper surface of annular fitment 68.

Fig. 18 illustrates the refill cartridge with a pair of collapsible pouches 70 attached to the annular fitment 68. Below the annular fitment and across a mouth of each of pouches 70 is a frangible septum 72. An aperture 74 is formed in an upper surface of the annular fitment 68 formed to a depth sufficient to reveal at least a portion of septum 72.

Dispensers of the present invention operate in the following manner. With container 2 separated from collar 6, a refill cartridge 14 is inserted within the hollow area of container 2. Collar 6 is then snap-fit onto container 2. Automatically accompanying this procedure, the sharpened mouth ends 62 of each connector tube 26 pierce respective frangible septums 72. Airtight communication is thereby established between an interior of each pouch 70 and a respective one of the collecting chambers 20. Initially each pumping mechanism must now be primed. Hand pressure downwardly against cover 10 forces ribs 42 to downwardly press upon the respective elastomeric domed walls 18. Any residual air or product in the collecting chambers 20 is forced through the one-way monitoring valve 28 causing rubberized flap 30 to open. Trapped air and/or product expelled through the flap 30 then passes outwardly through respective channels 58 of nozzle 8. Upon release of pressure against cover 10, the elastomeric domed walls 18 resiliently return to their outward domed position. Suction created by the resultant vacuum of flap 30 closing and elastomeric domed walls 18 returning to their original decompressed shape causes product to flow upward from each

pouch through respective connector tubes 26 past respective one-way check valves 22 into respective collecting chambers 20. On the next downward stroke, pressure against the elastomeric domed walls 18 causes product with relatively little air this time to exit through the one-way monitoring valve 28 again pushing open flap 30 to exit through nozzle 8. Fig. 8 best illustrates this pressurized flow pathway.

The foregoing description and drawing represent typical embodiments of the present invention but are not intended as limitations on the scope thereof, it being understood that the invention can be practiced through obvious modifications and rearrangements without departing from the essential spirit thereof.

WHAT IS CLAIMED IS:

1. A multi-compartment dispenser comprising:

(i) a container having a first and second end;

(ii) a plurality of compartments within the container, each compartment

storing a pumpable product;

(iii) a plurality of pump means each for drawing product from a respective one of the plurality of compartments, the pump means being positioned over the first end of the container and comprising:

(a) a connector tube with upper and lower ends;

(b) a collecting chamber for receiving product drawn upward from the connector tube;

(c) a one-way check valve interposed between the upper end of the connector tube and the collecting chamber;

(d) an elastomeric wall at least partially positioned over and communicating with the collecting chamber, the elastomeric wall being resiliently pressable thereby capable of compressing the collecting chamber;

(e) a dispensing member communicating with the collecting chamber having an exit orifice through which product can flow outward;

(f) a one-way monitoring valve downstream from the collecting chamber controlling the outward flow through the dispensing member ;

(iv) a means to simultaneously activate the plurality of pump means.

2. The dispenser according to claim 1 wherein the one-way check valve comprises a ball whose positioning regulates product flow.

5 3. The dispenser according to claim 1 wherein the elastomeric wall is domed.

10 4. The dispenser according to claim 1 wherein the dispensing member is an outwardly projecting nozzle rigidly affixed relative to the container.

15 5. The dispenser according to claim 1 wherein the dispensing member is a movable spout capable of pivoting through an arc of at least 60°.

20 6. The dispenser according to claim 1 wherein the one-way monitoring valve is formed of an elastomeric rubber, flow through the valve being regulated by pressure exerted to open a normally closed exit slit or flap.

7. The dispenser according to claim 1 wherein each compartment is formed of rigid walls.

25 8. The dispenser according to claim 1 further comprising a cover movable vertically relative to a longitudinal axis of the dispenser and capable of simultaneously compressing each of the elastomeric walls found in the plurality of compartments.

30 9. The dispenser according to claim 1 wherein each compartment is formed of a collapsible pouch for closed containment of product.

10. The dispenser according to claim 9 further comprising a frangible septum covering at least a portion of an upper end of each pouch.

5 11. The dispenser according to claim 10 wherein the connector tube has a sharpened mouth capable of piercing the frangible septum.

10 12. The dispenser according to claim 9 wherein the pouch is a passive flaccid bag having integral therewith at least one passive means that manages collapsing of the bag.

15 13. The dispenser according to claim 12 wherein the passive means is a flimsy, substantially rectangular shaped film of plastic extending from a bottom region of the bag to a short distance from the dispensing end so as to assure complete emptying of the bag at final stages of aspirating product.

14. A refillable multi-compartment dispenser comprising:

20 (i) a container having a first and second end;

(ii) a plurality of replaceable cartridges within the container, each cartridge including a collapsible pouch for closed containment of product; and

25 (iii) a plurality of pump means each for drawing product from a respective one of the plurality of pouches, each pouch having a dispensing end communicating with a respective one of the pump means.

Fig.1.

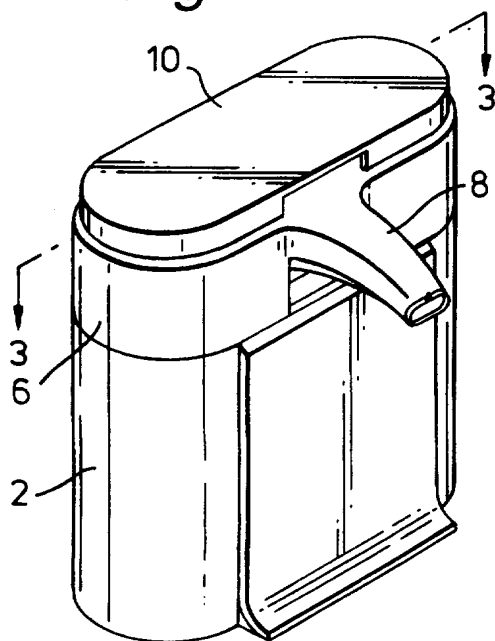


Fig.2.

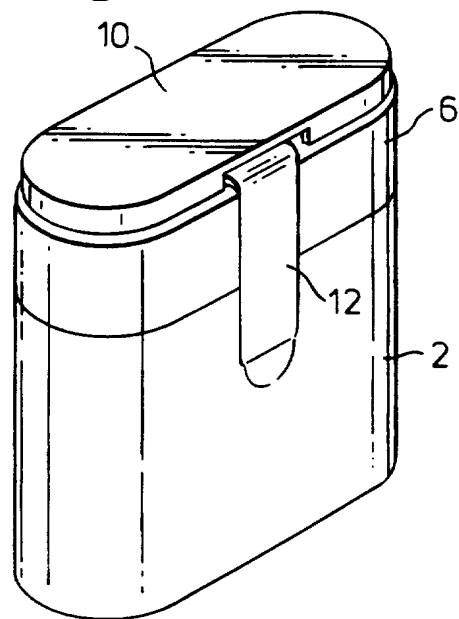


Fig.3.

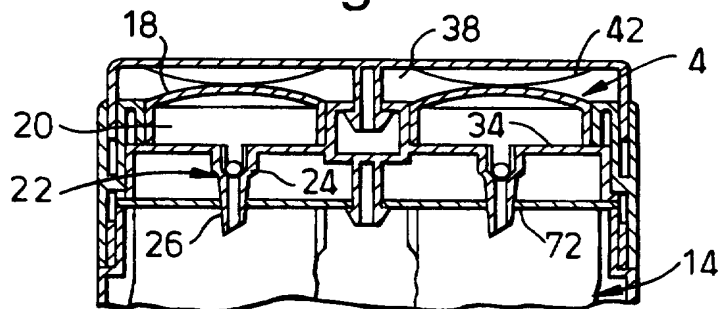


Fig.4.

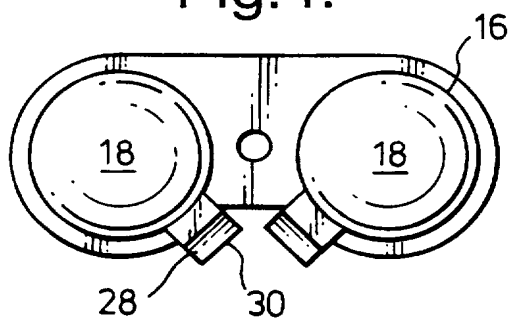


Fig.5.

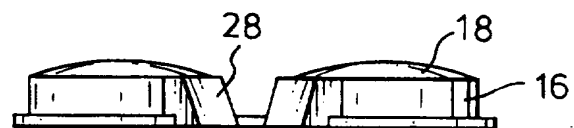


Fig.6.

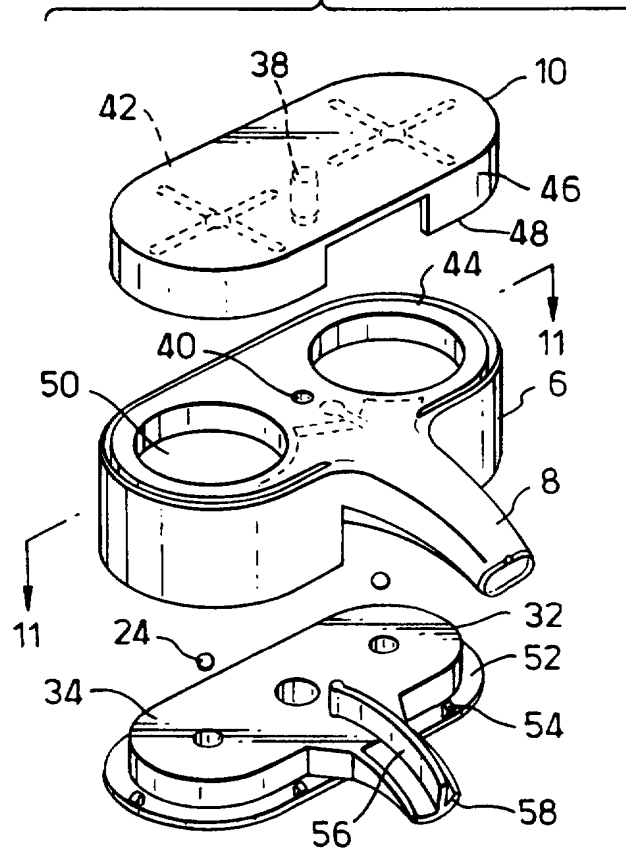


Fig.7.

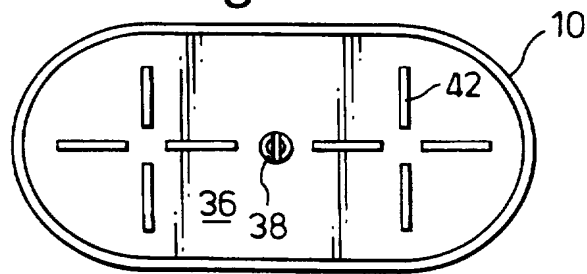


Fig.8.

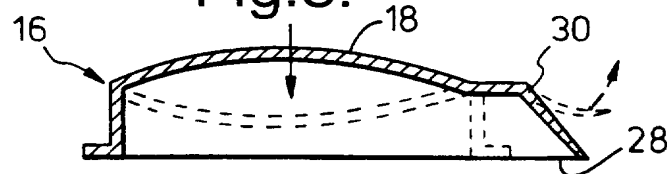


Fig.9.

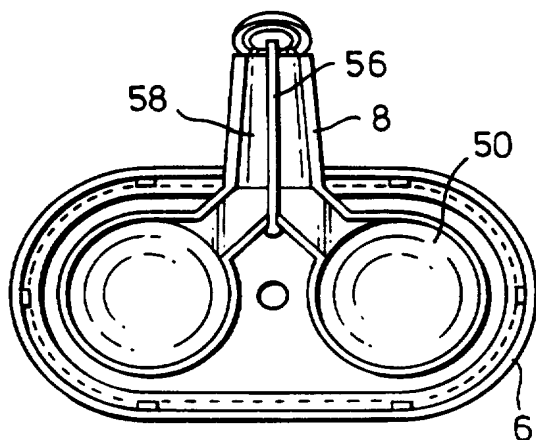


Fig.10.

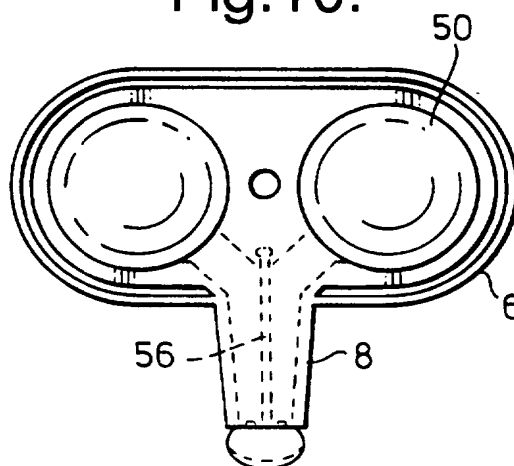


Fig.11.

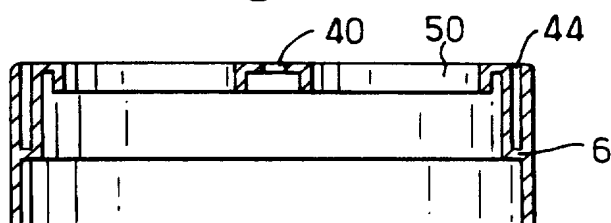


Fig.12.

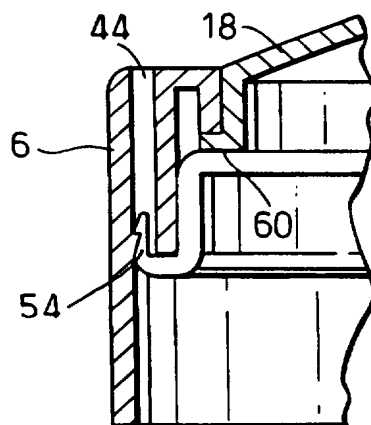


Fig.13.

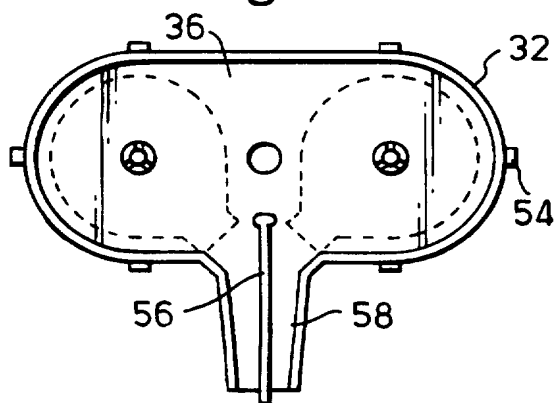


Fig.14.

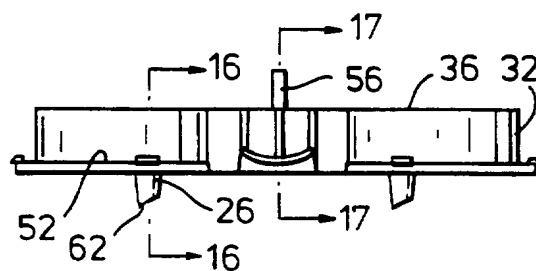


Fig.15.

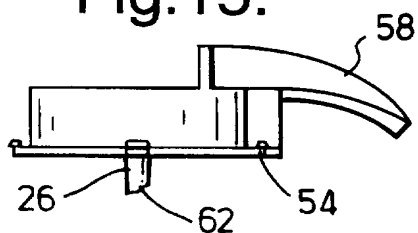


Fig.16.

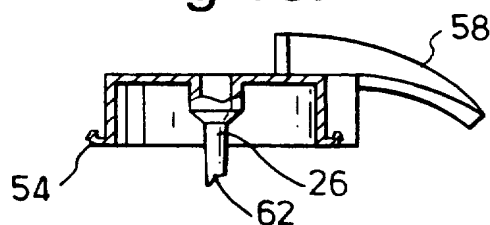


Fig.17.

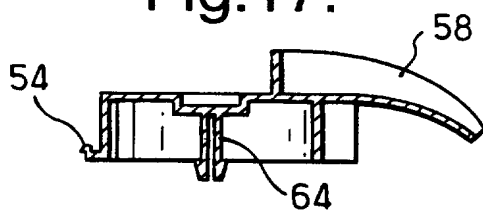
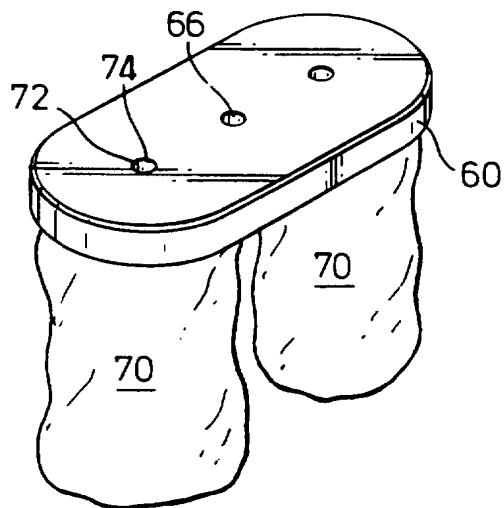


Fig.18.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 97/00204

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D47/34 B65D81/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 93 02 196 U (SCHUCKMANN ALFRED VON) 16 June 1994 see the whole document ---	1,3,6-8, 14
X	EP 0 520 315 A (ANDRIS RAIMUND GMBH & CO KG) 30 December 1992 see the whole document ---	1,6-8,14
X	EP 0 452 260 A (PLASCO SA) 16 October 1991 see the whole document ---	1,6-8,14
P,X	EP 0 751 077 A (GUALA SPA) 2 January 1997 see the whole document ---	1,3,4, 6-8,14
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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